

# TECHNICAL BULLETIN: FAIRCHILD 660, 670

FAIRCHILD RECORDING EQUIPMENT CORPORATION, 10-40 45th Avenue, Long Island City 1, N. Y.

## FAIRCHILD LIMITING AMPLIFIERS

The World Accepted Standard for Level Control

If you examine any monophonic or stereo record or tape available today, from any major labels throughout the world, it undoubtedly uses a FAIRCHILD limiter in its production somewhere along the line. More and more companies throughout the world specify and use the FAIRCHILD limiters, Model 660 or 670 for the following reasons:

1. Complete absence of audible thumps normally associated with other limiter designs and a complete absence of distortion or noise normally associated with conventional limiters.
2. Extremely fast attack time — the FAIRCHILD 660 or 670 can produce full limiting in the first 5,000th of a second.
3. Variable release time. The FAIRCHILD 660 or 670 allow a variable from .3 of a second to 25 seconds, conveniently available on the front panel in the form of a 6-position switch.
4. Can be used as a limiter or a compressor depending on the program material and personal preference.
5. Reliability and stability.
6. Two models available: single channel Model 660 or the unique stereo model 670.

The FAIRCHILD LIMITER is available in two versions — the monophonic single channel unit, the MODEL 660, and the unique stereo version, the MODEL 670. The following basic design points apply to both.

The basic design uses a single push-pull stage of amplification with an extremely high control voltage. The result: the unit never produces any audible or observable thumps and, unlike other conventionally-designed limiters, the unit has extremely low distortion and noise under all conditions, either as a limiter or a straight through amplifier.

The fast attack time catches short transients that can, in other limiters, negate the limiting effect. The release time of .3 to 25 seconds provides real flexibility. Three positions (six are available) make the release time a function of program material, fast recovery for short duration peaks and overall reduction of program level should the program level remain high.

Ample and accessible input controls, threshold controls, attack and release time and metering controls.

The unit can be used as a limiter or compressor, depending upon personal taste and program material. A 2 to 1 ratio as a Compressor with a threshold 5 db below average level, and as a peak limiter with a 30 to 1 ratio with a threshold 10 db above normal program level. The unit



can also be adjusted to operate anywhere between these two extremes.

Reliability and stability: all components operate well below their rated maximums, insuring trouble-free performance, and guarantee of day-in-day-out performance results. Masters made one day can be duplicated months later and with the same control settings.

Two models are available: the single channel monophonic version, MODEL 660, or the versatile two-channel stereo version, MODEL 670.

In addition, the MODEL 670 is designed for stereo level control problems specifically. The 670 on one chassis incorporates two independent limiters that will act on left and right channels or which will act on the lateral and vertical (sum and difference) components of the two stereo channels. This latter is accomplished by first bringing the two stereo channels through a matrixing network and then dividing them into their respective lateral and vertical components, limiting these lateral and vertical components and then recombining through a second matrixing network into left and right channels again. Using this FAIRCHILD matrix Limiter design, thousands upon thousands of stereo masters have been cut with maximum useable level and efficient use of available groove space, resulting in high level recordings with long playing times. This Limit-Matrix system of the 670 now finds the same importance in the new art of stereo broadcasting. No wonder that the FAIRCHILD limiters are used by the major labels and major recording services and quality conscious radio stations throughout the world.

# **SPECIFICATIONS** (Each channel, unless otherwise specified)

INPUT IMPEDANCE	600 ohms
OUTPUT IMPEDANCE	600 ohms
RANGE OF INPUT LEVEL	0 dbm to +16 dbm. (-4 dbm to +16 dbm) (Model 660)
OUTPUT LEVEL	+4 or +8 dbm (+27 dbm clipping point).
GAIN	7 db (16 db Model 660)
FREQUENCY RESPONSE	30 cycles to 15 kc $\pm$ 1.5 db.
SEPARATION (Does not apply to 660.)	A-B position: 60 db Vertical-Lateral position: 40 db
NOISE LEVEL	70 db below +4 dbm.
LIMITING NOISES	Below audibility.
INTERMODULATION OR HARMONIC DISTORTION	Less than 1% at any level up to +18 dbm output (no limiting). Less than 1% at db limiting +12 dbm output.
ATTACK TIME (adjustable)	.2 milliseconds on positions 1, 2, and 6. .4 milliseconds on positions 3, 4, and 5.
RELEASE TIME (from 10 db of limiting)	Position 1: .3 seconds. Position 2: .8 seconds. Position 3: 2 seconds. Position 4: 5 seconds. Position 5: Automatic function of program material: 2 seconds for individual peaks. 10 seconds for multiple peaks. Position 6: Automatic function of program material: .3 seconds for individual peaks. 10 seconds for multiple peaks. 25 seconds for consistently high program level.
COMPRESSION RATIO	A function of the amount of limiting as well as setting of the two threshold controls which can be set to operate at ratios from 1:2 to 1:30.
POWER REQUIREMENTS	115 volts, 50-60 cycles AC, 3 amps.
STABILITY	Unit maintains stability of gain, gain reduction and balance over the range of line voltage fluctuations from 100 to 127 volts.
CONTROLS	a) 2 Input Gain Controls: Step attenuator: 1 db per step. b) 2 Threshold Controls: Continuously variable. c) 2 Time Constant Switches: 6 positions so as to provide fixed and variable time constants for any type of program material. d) 2 Metering Switches: 3 positions so as to measure plate current of each control tube, or as a limiting indicator. e) Mode Switch: A-B position: 2 independent limiters. Vertical-Lateral position: matrixing input and output, left and right in and out, limiting action vertical-lateral. f) ON-OFF Switch
MECHANICAL DIMENSIONS	Standard 19" rack, 14" panel space, depth behind panel 11".
WEIGHT	Approximately 65 lbs.
TUBE COMPLEMENT	8-6386; 1-6084; 1-5651; 2-12AX7; 2-12BH7; 1-EL34; 4-6973; 1-GZ34 (5V4).

The Model 660 is a single channel Fairchild Limiter. The above specifications apply with the following exceptions: no separation figure needed on the 660; all controls are single, not double as in 670; only half the number of vacuum tubes are used; and an additional 8 DB of gain is available in the 660.